

## Preface

Real-time three-dimensional (3D) echocardiography, which became commercially available in 2002, is the most recent, major advancement in echocardiography. Providing direct viewing of 3D cardiac surfaces during live scanning, it adds fundamentally new information to the echocardiographic assessment of heart diseases, and it has already significantly changed echocardiographic diagnoses. Although echocardiographic examiners are used to interpreting cross-sectional images, conventional two-dimensional (2D) echocardiography requires mental 3D reconstruction of cardiac structures. This is prone to error and can be difficult to communicate. Real-time 3D echocardiography, in contrast, provides direct, anatomically realistic visualization of 3D structures, such as an en face view from the left atrium to the mitral valve or the direct view of a multifenestrated atrial septum. Beyond this, real-time 3D echocardiography allows for the first time accurate quantitative assessment of structures, volumes and spatial relationships without any geometric assumptions. Therefore, this gives the technique a unique advantage over conventional 2D echocardiography.

However, the practical application and data analysis of real-time 3D echocardiography has been shown to substantially differ from conventional 2D echocardiography. While in 2D echocardiography, the image information is all obtained from a 2D sector view that is manually optimized to present the best image information, real-time 3D datasets facilitate unlimited viewing from all directions of the dataset and unlimited viewing perspectives of structures within the dataset. This freedom of unlimited 3D visual assessment, however, requires knowledge and experience about how to live scan, acquire, and analyze volumetric datasets.

### EyeCatcher

Practical application and data analysis of real-time 3D echocardiography differs substantially from conventional 2D echocardiography.

This book is both an illustrated textbook and a practical guide to real-time 3D echocardiography. It provides a comprehensive overview of this fascinating technology covering all clinically important aspects, including a substantial explanation of the basic principles of 3D technology, step-by-step introductions to basic aspects of clinical application, and detailed descriptions of specific applications in the broad spectrum of clinically important heart diseases. What also

makes this book an invaluable companion, when working with real-time 3D echocardiography, is an in-depth review of the most recent literature which is provided in each chapter.

The book contains a large number of comprehensively illustrated clinical case examples, which demonstrate how real-time 3D modifies decision-making in echocardiographic practice. However, while focusing on real-time 3D echocardiography, the book does not claim to be a full textbook on either echocardiography or on cardiac diseases.

To illustrate the added benefit of 3D image information, most case examples also include conventional 2D image information for comparison. However, it is important to emphasize that the authors have aimed to highlight the complementary nature of the two techniques where, on the one hand, 3D visualization adds important diagnostic information to a standard 2D echocardiographic examination and, on the other hand, 2D cross-sectional information on structure and thickness of valves, walls, and masses is indispensable for complete understanding of 3D datasets.

### EyeCatcher

Real-time 3D echocardiography and conventional 2D echocardiography should be considered complementary modalities.

The authors of this book have all been intensely involved in interactive training courses on 3D echocardiography over the past years and have included their training experience as well as the most illustrative case examples into each chapter. Thus, this book serves as a valuable educational compendium to both individual learning experiences as well as expert-guided training courses.

Since a strong focus of the book is on practical application of real-time 3D echocardiography in daily clinical routine, its chapters and case examples are organized so as to provide valuable tips and tricks for both beginners and experts. In addition, because the heart and echocardiographic imaging are both dynamic and because dynamic information is critical for understanding, the majority of echocardiographic images within the book are accompanied by the full video sequences on the included DVD.

**■ 2<sup>nd</sup> edition**

After a very successful 1<sup>st</sup> edition, with more than 1000 copies sold, this book presents the 2<sup>nd</sup> edition which is a full revision of the 1<sup>st</sup> edition, preserving the overall concept and structure of the book but adding a comprehensive update of all chapters with new illustrative cases, new recommendations from recent guidelines, and new important literature.

Since the 1<sup>st</sup> edition was published in 2011, the field of real-time 3D echocardiography has demonstrated marked progress with new 3D acquisition software solutions such as one-beat full volume and live 3D color-Doppler, new 3D analysis software solutions such as the heart model 3D volumetry and the 3D navigator, and, importantly, publication of several recommendations on the clinical application of real-

time 3D echocardiography. Furthermore, the recent technical advancements have resulted in real-time 3D echocardiography being used in new places in cardiac centers. For example, periinterventional guidance and monitoring in the catheterization lab has become and will continue to be the most rapidly progressing clinical application of real-time 3D echocardiography.

Thus, we believe that a 2<sup>nd</sup> edition of the book is timely and hope it will be as valuable to readers of various professions like sonographers, physicians, scientists, and students, as the first apparently was.

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